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JPRS: 4123

24 October 1960

Surabaya Glass Industry
~~POPULATION INCREASE AND RICE PRODUCTION~~

- INDONESIA -

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POPULATION INCREASE AND RICE PRODUCTION

- Indonesia -

[Following is the translation of an article by Doctoral Candidate Soebarna entitled "Pertambahan Penduduk dan Produksi Beras" (English version above) in Dian (The Lamp), Vol VIII, No 2, Djakarta, Mar 60, pages 2-5, and Vol VIII, No 4, Djakarta, Apr 60, pages 12-18].

On the Ninth of March of 1959, there went into operation for the first time in Indonesia a glass factory which was entirely automatic in operation and which was capable of producing goods the level of workmanship of which is conformant to standards which have been reached by modern technology in the field of glass manufacture. Since the date referred to, there has been opened up for Indonesia the possibility of continuously producing itself a number of glasswares which previously had to be imported from abroad. Previous thereto, Indonesia did not possess any factory capable of turning out bottles able to withstand gas pressures of the order of six to eight atmospheres, such as was the case in imported bottles, so that they could be employed as beer bottles, carbonated beverage bottles, and the like. This circumstance resulted in the fact that Indonesia in this respect had to depend upon foreign sources. It is obvious that a condition of this sort imposes an additional burden (and not a trivial one) upon the shoulders of the national foreign-exchange supply, all the more so if it be recalled that the requirements of Indonesia for bottles referred to just now in particular and other glass wares in general will increase pari passu with the passage of time.

The erection of a glass factory able to eliminate or at least to narrow down the issuance of the national foreign exchange means further the achievement of Indonesian industrialization with its advantages. Among these are a broadening in work-opportunities for the public, an approach by so much closer to a self-supporting status, and the stimulation of the fruition of its internal economy in general, as well as the initiation of research projects looking toward the employment of raw materials of domestic origin which previously either were entirely overlooked or received insufficient attention. With the lighting off of the first heat in the first furnace of the Surabaya Glass Industry, Ltd., (abbreviated P. T.

IGLAS, for such is the firm name which Dian would like to introduce to one and all) which took place on 9 March, 1959, an important step in the field of our national industrialization has been achieved.

IGLAS, Ltd., in its present form, was originally spawned on 29 November 1956, as a successor to N. V. NIGLAS [presumably Naamloze Venootschap Nederlandsch-Indische Glasfabrik -- Netherlands Indies Glass Factory, Ltd.], all the shares of which has been purchased by the Bank Industri Negara BTN (National Industrial Bank). As the sole proprietor of all the shares, BIN had already engaged in a contract signed in November 1955 with the Societe Mecanique Verriere (SMV) [Mechanized Glassware Corp.], which is a consolidation of various French firms manufacturing glass-factory machinery. In this agreement, based upon five-year term credits extended to Indonesia by the French government, SMV expressed its willingness to (a) supply all machinery and apparatus necessary for the erection of a complete glass factory capable of the manufacture of bottles able to withstand gas pressures of six to eight atmospheres, inclusive of the manufacture of decorations on the bottles as well as the manufacture of drinking glasses; to install the factory machinery referred to, to supply repair parts for three years, to supply 13 expert personnel to set the factory in operation and to bear responsibility for the quality of the products, and to instill guidance (technical know-how) to Indonesian personnel for three years, beginning with the lighting off of the first furnace. The object of this period was in order that later, after the expiration of the contract, the factory might be operated by the Indonesian personnel themselves.

Shortly after the signing of the contract mentioned, a start was made with the erection of a factory building on Ngagel Street, Surabaya. On 22 March 1956, the first foundation piling was driven into the earth. In accordance with the initial plan, the factory should have been able to start operations in the middle of the year 1957, but, as is obvious, various factors brought about a delay amounting to about 1 3/4 years. Among these were the delays encountered in removing squatters from the site, the height of the ground water level, which delayed pouring the foundation because there were required a large total number of foundation pilings (more than 400) and also political disturbances which sprang up at that time as a result of the West Irian Action and which caused many contracts which had already been awarded to Dutch contracting firms to be rescinded.

As has been stated above, the IGLAS factory is the first and to this date the only glass factory in Indonesia which operates in fully automatic fashion. Based upon calculations from the years 1956 through 1958, the price of all the factory machinery amounted to \$US 1,160,000 (cost and freight) and the cost of the entire factory structure was around 20 million rupiah. The outlay for the entire erection of the IGLAS factory (inclusive of the price of machinery, factory structures, expenses such as installation of

machinery, housing, vehicles, and so forth) totalled up in the neighborhood of 65 million rupiah. A month after the first kiln fire was lit off on 9 March 1959, i.e., on 9 April 1959, the first products of IGLAS were shipped.

The particular material for the manufacture of glass is sand, or more precisely quartz sand. But in order to facilitate the manufacturing process and to obtain glass of satisfactory quality together with specifications and color in accordance with that which is desired, a number of other substances must be added to the sand. For the preparation of glass which is truly satisfactory, such as is made by IGLAS, the raw materials required consist of sand, soda ash, dolomite, calcite (both of the latter being forms of calcareous rock), sodium nitrate, sodium sulphate, arsenous oxide (the three of these for green and white colored glass), topazine (for chocolate-amber colored glass), carbon or finely pulverized wood charcoal (for chocolate-amber colored glass), iron oxide (for green colored glass), selenium, cobalt oxide (these two for white colored glass), and glass fragments.

It was just now stated that among the additional ingredients there were those which are used to facilitate the process of manufacture. Herein lies the function of the soda ash. Quartz sand does not melt, even at a temperature of $1,520^{\circ}\text{C}$. This fact complicates the manufacture and may give rise to increased difficulties in the factory installations if some other course not be pursued. For this purpose, the soda-ash mentioned is mixed in, which results in the sand's being fusible at a temperature of $1,520^{\circ}\text{C}$.

Glass for which the raw materials have been prepared only from sand and soda ash alone is a glass which can be dissolved (soluble glass, so-called). In order to improve this condition, there are required materials which are termed "stabilizers" (substances which render it stable), consisting of 3 sorts: dolomite, calcite, and aluminium oxide. By the addition of the three "stabilizing substances" mentioned, there is obtained a glass which is commercially utilizable, since it already has the property of withstanding solvent substances.

As a matter of fact, the basic goal, that of obtaining a commercially usable glass, has already been achieved, but glass in this condition still has its shortcomings. The glass which has been "stabilized" has a neutral color, that is, a somewhat greenish hue. Depending upon the precise chemicals which are contained in the substances employed, glass at this stage may have a slightly greenish tint or may be strongly green.

The present-day coloring process which follows demands definite ingredients. If the color desired is white, then there are required substances to overcome the color (decolorizers), consisting of selenium and cobalt oxide. If the color desired is green, then the neutral color mentioned is rendered more green with iron oxide. If it be a chocolate color which is desired, then

the requisite supplementary substance is topazine, aided by fine wood charcoal. The aid of this wood charcoal is necessary since topazine will not operate beyond a certain point.

After this, there still are needed various additional chemicals for the purpose of perfecting the yield. The substances referred to are ripening substances (fining agents), consisting of sodium nitrate, sodium sulphate, and arsenic oxide, all three of which are necessary in the manufacture of white glass.

It is clear to us that the IGLAS factory requires some ten to twenty sorts of substances for the needs of its operation. A portion of the substances referred to are derived from various regions within the country and a portion must be brought in from abroad. This commentary means on the part of IGLAS that the mobility in transport on the one hand and in the import procedure on the other must be dependable in order to minimize factors which hinder production. IGLAS has no guarantee that raw materials which are requisite from abroad will arrive at the time they have been counted on, because of one or another sort of hold-up in the procedure for admitting imported goods. This unreliability in the entry of standard goods from abroad has indeed already disturbed the course of production during the period 17 September 1959 through 22 October 1959.

The raw materials which must be imported are soda ash, aluminium oxide, topazine, selenium, cobalt, sodium nitrate, sodium sulphate, and arsenic oxide. If we take as a standard the month of March, 1960, then the value of all the standard raw materials imported amounted to a total of 1.5 million rupiah at the factory. Previously, before IGLAS was in operation, the payments for imported wares which are now manufactured here required the issuance of foreign exchange certificates valued at more than 10 million rupiah monthly. From this viewpoint, it is clear that IGLAS has compressed the issuance of national foreign exchange by about 85% in its field.

The raw materials originating domestically are quartz sand, dolomite, calcite, wood charcoal, and glass shards. The value of the domestic raw materials taken as a whole reach a total of 1.5 million rupiah monthly (the month of March, 1960, as a standard). The necessary sand amounts to around 15 tons per 24 hours, and it is brought from Belikpapan area and sometimes from the Bangka and Belitung [Billiton] island groups. This extensive distance results in the price of these ingredients amounting to 1,050 rupiah per ton, of which total around 80% consists of transport expenses. For that reason, the management of IGLAS has taken steps toward obtaining sand in areas near Surabaya and geological investigations are now being carried out in the Tuban area (near Gresik). The expense of transporting sand from Tuban to Surabaya is 500 rupiah per ton, which will render possible a lowering in the cost of production. But the sand must also fulfill definite conditions: for example, its iron content may not exceed 0.08% for the preparation of chocolate-amber glass and may not exceed 0.03% for the preparation of white glass. Furthermore, the sand must

have such a quality as not to produce friable glass, such as is the case with sand from Lodan (near Rembang), which fact was clearly demonstrated in one of the experiments carried out by IGLAS. Lodan sand clearly may be used only as a part of mixtures.

The problem of the sand supply in areas near the factory, apart from being one of quality, also is a matter of quantity. The sand must lie at hand in a total amount sufficiently large to ensure continuity in production for a period of time which is not unduly short.

Dolomite and calcite are brought in from regions such as Bodjonegoro, Tulungagung, and Sekapu (north of Gresik). IGLAS requires, in every 24 hours six tons of dolomite and three of calcite. Glass fragments are required to the extent of 3½ tons every 24 hours and are purchased at a price of 2.50 rupiah per kilo for green and 3 rupiah per kilo for white.

We have already explained that the manufacture of glass by IGLAS is carried out entirely by machinery and automatically throughout. Along broad lines, the manufacture consists of four steps. The first step is that of preparing the raw materials. In this step, there are encountered three sorts of apparatus: apparatus to render fine (crushers), to break up glass fragments; apparatuses (grinding mills), to crush respectively dolomite and calcite, after which they are sent to silos whence the glass shards, sand, dolomite, and calcite are taken to be weighed out in accordance with the required formulae, and finally a stirring apparatus (mixer) where all four substances above are mixed to become one.

The second step is that of smelting the materials which have already been mixed into an homogeneous whole. This step consists of furnaces or kilns, which fuse the mixture of raw materials for glass above at a temperature of 1,520° C until they have become liquid. IGLAS has two kilns, one for chocolate or amber colored glass and the other for green and white colored glass. The capacity of both furnaces is 25 tons per 24 hours.

The third procedure is that of formation of wares or articles. Glass wares consist of two sorts: blown articles, such as bottles, and pressed articles, such as drinking glasses. The four machines owned by IGLAS at the present time consist of three for blown articles, for the manufacture of bottles such as large beer bottles (650 cc capacity), brandy bottles (750 cc), and small beer bottles or carbonated beverage bottles (350 cc), plus one pressing machine for the manufacture of drinking glasses.

The final step is that of "settling", which anneals and cools the newly-completed wares, formed at a temperature of 1,520° C. These articles move quite slowly on an endless belt through a tunnel which at the start is held at a temperature of around 600° C, and finishes at normal room temperature. This process occupies from two to two and one half hours of time, approximately. Following this, the wares are ready for packing and delivery. At specified times, one or another of the articles produced is

removed and sent to the laboratory for the purpose of pressure tests in the bottles as mentioned above, in order to control the quality of production. The entire process, from raw material to final finished product, requires 1/4 to 1/3 of a 24-hour period.

The productional capacity of one blowing machine at IGLAS consists of 23,000 large beer bottles per 24 hours or 32,000 small beer bottles. The fourth machine, vide supra, that is the pressing machine, will be brought into action according to plan during this year also, for the production of drinking glasses, with a capacity of 24,000 such every 24 hours or 1,000 drinking glasses hourly.

The operational efficiency of IGLAS has achieved the figure, on the average, of 97 to 98%. In contrast with other firms, who hope for the highest possible efficiency, on the part of IGLAS the figure just mentioned gives rise to the question of how to supply broken glass fragments to the amount of three and a half tons in every 24 hours, which are required as "pre-melters" for the raw materials which are to be smelted in the kiln. Only with an efficiency rate of 85% or less can the problem of supplying glass shards be solved by IGLAS as an internal matter.

The distributional channel for the products issuing from IGLAS is P. T. USINDO [USINDO, Ltd.]. Herewith is a summary of prices during the middle of the year 1960 (sales tax included):

| <u>Form of bottle</u> | <u>Color</u> | <u>Capacity</u> | <u>Price in rupiah</u> |
|----------------------------------|--------------|-----------------|------------------------|
| beer | amber | 650 cc | 6.55 |
| lemon (i.e. carbonated beverage) | amber | 350 cc | 4.25 |
| lemon (i.e. carbonated beverage) | greenish | 350 cc | 4.15 |

Leadership of IGLAS lies in the hands of the managerial staff, consisting of one president-director (Mr. Soenggono) and two directors, (Atty. The Boen Hwan and Engineer Soegeng Soendjaswadi), for administrative-financial arrangements and for technical arrangements, respectively.

Actual production lies in the hands of the team from France, which is lent to IGLAS during a period of three years as was specified in the contract. Engineer D. Moulin serves as director of the factory (plant manager) and head of the French team. Responsibility for the entire course of production has rested upon his shoulders for the three years since the factory began operations. He has at his side an Indonesian technologist, Engineer Soetatmo, as vice-director of the enterprise. In order

to execute his duties, Engineer Soetatmo has already practiced in one of the glass factories of Le Havre (France) for a year. He is assisted by a machinery expert, Engineer Warsito. The French team at IGLAS consists in its entirety of 13 persons. For the purpose of training intermediate-level technicians, there have been allotted to IGLAS 26 youths, graduates of the Technical Middle School, and 44 graduates of the Technical School. These last have been employed since the month of December, 1958, and thus since three months before the start of operations in the factory. This opportunity has been employed in drilling them in the assembly and repair of the machinery. The first part of the factory to be turned over by the French group to Indonesian personnel was the factory's kilns. This event took place at the end of 1959, or about nine months after the organization started to function. The employees of IGLAS amount, in all, to 466 persons, of which total 307 persons work in the glass factory. Operations in the factory section continue uninterruptedly throughout the 24 hours every day, divided into three shifts with four work teams, save in the raw materials mixing division and the packing division, each of which operates with two shifts. A satisfactory labor agreement exists in the IGLAS organization. The enterprise has already taken and continues to take steps for the interest of its workers' welfare.

With its assistance, which assumes the form of sparing the expenditure of foreign exchange, the offering of opportunities for youths to grow up in the modern world of industrialization, experimentation, and research which is being carried on or will be stimulated, and things of this sort, IGLAS occupies an important position in the Indonesian economy.